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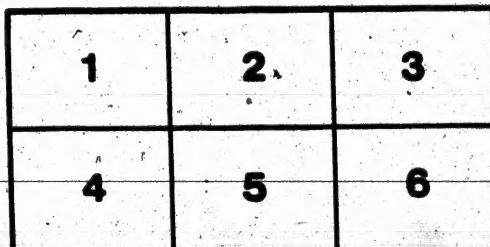
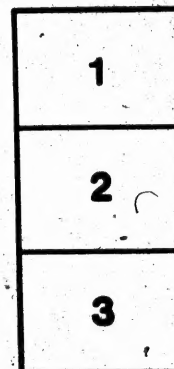
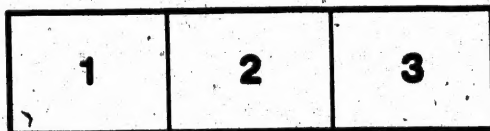
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to win results like these for the next ten years, at the end of that time a very large majority of the medical practitioners in this province will be graduates of this University, a distinction which should have been hers during the past thirty years. Without looking so far forward, however, we are justified in stating that, through the Medical Faculty, the Provincial University now exercises an influence in medical education corresponding to that which she exerts through her Arts' Faculty upon the liberal education in the province. And when in the near future she may have to consider the ways and means in the matter of expansion, let us hope that the influence in a new quarter may be of the greatest service to her.

I must not forget to mention that the Faculty has not been unmindful of other matters in which the student is to a very great extent interested. During the last session it recommended to the University Senate such a revision of the medical curriculum as would make it more in accord with that of the British Medical Council and with the trend of opinion resulting from experience as to what medical education should be. The Senate adopted all the Faculty's recommendations. The changes affect only students who begin their undergraduate course now and subsequently. Students will be required to undergo only one examination in subjects in which the former curriculum made two compulsory. Honors under the provisions of the new curriculum are no longer to be given as heretofore, and are in future to be won only in groups of subjects. The examinations are simplified, and in the first the University now insists upon a competent knowledge of chemistry, biology, and physics before the student passes to the second year. This enables the student to do good, solid work in anatomy without being worried with the task of reading for an examination in that subject, the limits of which could never hitherto be fully defined for a first-year examination. That the University has not given chemistry, biology, and physics undue importance by making them alone the subjects of one examination is shown by the fact that the British Medical Council now requires all students to spend the first academic year in attendance upon instruction in these subjects, and with this regulation all the medical faculties and licensing bodies in Great Britain and Ireland must now comply.

I now proceed to discuss the future of medical science, and the bearing that possible advances in medicine may have upon the student's present course of study. This topic is one on which much may be said, and I take it up now because it is one of absorbing interest, and because, also, it is good for those of you who are preparing for a life of medical practice to be reminded that it is but a small part of your life's work to pass examinations, to acquire a degree and a license to practise, and that you may accomplish these things without, in the end, obtaining the

object of your life. The student, as a rule, does not, unfortunately, look more than three or four years ahead, and he is inclined to let the future beyond take care of itself. It does this, but without, however, paying much attention to him who does not employ each year as it passes for that realization of the ideal which is considered to constitute success. All courses of study and all examinations merely insure the lowest standard of attainment that the necessities of the times permit, and beyond this they leave to the student the question of shaping his own career. His success in the future depends greatly on his capacity for foreseeing the wants of the future. Do not misunderstand me when I speak of success. How often do we hear the success of a physician or surgeon estimated by the magnitude of his practice! How often also do we find that it is his ambition to have a practice which will, in fact, engross all his time! That is in no sense my ideal of success; nor should it be that of any one who has a proper idea of the dignity of the profession. Success is rather to be estimated by the degree of professional qualifications to which one has attained, and of the recognition by the public of the attainment. The public must not, however, be set up as the final and only judge of success, for sometimes ignorance, sometimes fashion, may make a quack or a sham the idol of the hour. That has happened often in the past, and will, in all likelihood, happen often again. It is, in fact, not the quantity of professional work done, but the quality of it, that is the measure of success.

In discussing the future of medical science, there are two questions which must first of all be answered: What is medical science, and how far into the future do we propose to dip? The first question may be answered by the statement that it is that body of knowledge obtained through observation and experiment concerning the origin, course, and termination of disease and the influences which modify it. This is pathology, but in a wider sense than that usually given the term. It includes, in addition to pathology in the narrower sense, the foundation sciences, biology, physiology, bacteriology, and physiological chemistry; and whatever, therefore, advances these will in a great measure aid in the advancement of medical science. The latter must always be in advance of medical practice, for it will always excel our knowledge of how the controlling influences are to be used or best employed; but the distance between the two will always depend on the skill and intelligence of the profession as a whole in any one generation.

In regard to the other question, I may say that to discuss the condition of affairs which shall obtain when we shall have ceased to take an interest in them is a performance of simple intellectual amusement, and of no practical advantage to us; and, as the average length of a practitioner's life ranges between thirty and forty years, a period of thirty-five years, reaching

beyond the close of the first quarter of the next century, embraces for us the extent of the future which we may comprehend in the outlook.

How will medical science develop within that time?

In this forecast I will not attempt to prophesy, for one may do something more substantial than that. We may rely on the progress of medical science during the last thirty-five years, on what human necessities demand, and on the tendencies of research at the present day to guide us in determining the development of some parts of the science at least; and we have also as an influential factor in shaping its future the appreciation in which medical research is held to-day.

The by far greater part of our knowledge of disease has been established within the last thirty-five years, and if we examine the history of research for that period we will find that any considerable advance in our knowledge in that department has been the outcome of a greater advance in some one of the foundation sciences, physiology and physiological chemistry in the earlier years specially, and bacteriology and pathology in the later years. I might illustrate what advances these sciences have made by reference to physiology alone. Were an expert physiologist of the date 1860 transported through time to 1870, he would find himself very unfamiliar with the subject in its new form; and were he to reach 1880 in the same manner as he did 1870, it is extremely doubtful if he would consider it possible to put himself in that relation to his subject in which he was in 1860. It was possible then for him to be an accomplished physiologist, anatomist, human and comparative, pathologist, and physician at the same time; but in 1880 such a combination of qualifications was an absolute impossibility. During the last ten years more knowledge has been acquired from research in physiology than in all the previous twenty years, and with this accumulation the character of the subject has vastly changed. It was possible in 1880 for an accomplished physiologist to maintain at first hand an acquaintance with all the publications then constantly appearing embodying the results of original research in all departments of physiology; but with each succeeding year that became less and less possible, until now, when the literature annually appearing is so great in extent, that he who attempts such a feat is certain to fail. The periodical and other literature in some one department, as, for example, that dealing with the nervous system, is quite enough to engross his time; while if he wishes to keep himself acquainted with the literature in the other departments, he must depend largely on abstracts and summaries made by others. As a result of this widening of the subject, specialization in physiology has occurred to a very remarkable extent; and where a few years ago we had one species with but few varieties grouped under the genus physiologist, we find at the present day many species, each one rapidly developing into a genus. To-day, in-

stead of the general physiologist, there are the neurologist, the students of the physiology of secretion, or nutrition, or of circulation, each one working in his own particular field of research, which, as investigation goes on, is found to be of vaster extent than supposition allowed.

What I have said with regard to the progress of knowledge of animal physiology is true to a great extent also of histology, bacteriology, and pathology; and it is quite possible that were I as much conversant with the literature and progress in those sciences, an appreciative description of the advances in them, and especially in bacteriology, would meet with a greater assent from you, because of the general recognition, on the one hand, of the immense strides that surgery has, on account of it, made within the last fifteen years, and, on the other, of the fact that through it we know the causes of a very important group of diseases. I do not wish to diminish one whit the recognition of merit which that science has justly as its due, but I would like to point out that it has not been the cause of all the progress which has obtained for the last ten years, for had our knowledge of physiology remained as limited as it was in 1880 there would have been no triumphs in brain surgery; we would not have the knowledge of diseases of the nervous system that we now possess; and the medical treatment of functional diseases would have been as largely empirical as it was in 1880. Bacteriology, indeed, suddenly opened to surgery fields of work from which it was hitherto excluded, and the bountiful harvest that it has reaped has absorbed so much of popular attention that little is given to the unostentatious progress that medicine has made—a progress, let me say, with all due respect to the surgeon, greater than that made by surgery in the last thirty years.

Now, a comparison of the advances in physiology and pathology for the last thirty-five years shows that in both there has been an immense acquisition of knowledge, and that in each decade the increase has been made in arithmetical, if not in geometrical, proportion to that of the preceding ten years. Bacteriology has also since 1880 in its expansion exhibited the same rate of progress. This advance is one element upon which we must rely in the forecast of the future.

The other element is the appreciation of medical science which obtains at the present day. By this do not understand me to mean popular appreciation, but that enthusiasm which is shown in investigation in all departments of medical science. The additions that are made annually to our stock of knowledge in this line indicate that a host of scientific workers are constantly experimenting, observing, and recording, and that every year the number in the rank and file of investigators is increased by the accession of fresh recruits. That is an appreciation that is certain to continue whether the state countenances it or not.

It is interesting to inquire why medical science is under so little obligation to constituted authority. Why is it that when the state gives endowments for the advancement of learning in languages, mathematics, metaphysics, and the natural and physical sciences, it neglects, as a rule, to give assistance to medical research or medical education? Several reasons are to be urged in answer to this question, and for one of these we must examine the condition of medicine during the first half of this century, when it could not press any such claims to be considered a science as it now presents. While it consisted of much that was valuable, the greater part of it was pure empiricism. This was not all. There arose in the medical world a discussion on questions of a purely dogmatic character that should never have been introduced into medicine at all. Whether like cures like, or whether a disease is cured by a drug which produces the very opposite symptoms, were the questions of the day. There were others on which the very opposite answers were given. Is the therapeutical action of a drug increased the more if it is diluted or shaken, or the more finely it is divided? This discussion first arose in Germany, which gave, at the same time, origin to some other fantastic and absurd creeds in medicine, like Rademacherism, Isopathy, Ideal Pathology, etc., and it spread to England, France, and to this continent. These questions were even taken up by the lay world, and discussed, in some instances, with all the partisanship that characterizes party politics. Then some strove to adopt a position between the two camps, and this added to the confusion. What wonder is it that the public should, in the end, conclude that there was nothing scientific in medicine; that it was merely a matter of taste in more ways than one as to which school of medical practice you gave your adhesion when you desired medical treatment? Twenty-three centuries ago Hippocrates described a somewhat similar condition of medical practice which obtained in his time. After speaking of some physicians who constantly administer strained decoctions of barley, while others strain the juice through a cloth in order to prevent harm to the patient resulting from swallowing a particle of it; while others, again, give neither the juice nor the thick decoction until after the seventh day, or after the crisis, he says: "Physicians are not in the habit of mooted such questions; nor, perhaps, if mooted, would a solution of them be found; although the whole art is thereby exposed to much censure from the vulgar, who fancy that there really is no such science as medicine, since in acute diseases practitioners differ so much amongst themselves that those things which one administers as thinking it the best that can be given another holds to be bad; and in this respect they might say that the art of medicine resembles augury, since augurs hold that the same bird, if seen on the left hand, is good, but, if on the right, bad" ("On Regimen in Acute Diseases"). In the days of

Hippocrates, the introduction of creeds and dogmas into medicine and the consequent contempt of the vulgar did not matter; but the attempt made within the last one hundred years to introduce dogma and fanciful theory has resulted in retarding the development of medicine as a science of observation and experiment; and even at the present day, when we are not troubled so much with denominationalism in medicine, it has helped to prevent that recognition to which the science is entitled from the state.

Another reason for the indifference shown by the state to medicine and medical research, especially on this continent, is the fact that instruction in medicine has been very largely conducted and controlled by proprietary institutions. As these were managed for financial gain, it is manifest that they would spend as little as they could in equipping laboratories which cost money. It was to the interest of many of the teachers to teach the professional subjects well, for their own reputations were enhanced; but in instruction in the sciences there was very little of such inducement, for the air was full of talk about "practical" things and against "new-fangled notions." These institutions turned out a large number of medical practitioners, among whom were undoubtedly good men; but the ideas of many of these graduates concerning medicine and medical science could not be higher than those of the institutions from which they received their education. The advocates of the endowment of medical research have had to contend, therefore, with a confused public opinion, backed by the inertia of at least thirty thousand practitioners, and also with schools and colleges of medicine whose craft was endangered. According to a lecture recently delivered by Professor DaCosta, the number of medical schools and colleges in the United States constitutes the greatest enemy of medical progress, for the weaker ones, in order to have students and live, keep the standard down. A few years ago there were nearly three hundred of them, and they now number about one hundred and forty-five. As there are but about twenty-five medical schools and faculties in Great Britain and Ireland for a population of 38,000,000, it is obvious that if the same proportion obtained in the 65,000,000 population of the United States there would be about forty-five such institutions. Professor DaCosta says that they die at the rate of three a year, according to which it would take over thirty years to get rid of the not only needless, but harmful excess. The majority of them confer the degree of M.D., although they have no university connection whatever, and we owe to such a condition of affairs that the American medical degree receives so little respect the world over. We may find in this condition also the cause of the failure of American universities to mould professional life, at least in medicine. Of late years efforts have not been wanting

to bring medical education under the control of the state and other universities, and when such a result is fully attained no doubt the standard of efficiency in medical education will at once rise. We in Canada have all but succeeded in that respect, but the present condition of things was opposed by some who, for various reasons, object to the university and state control of medical education, nominally on the ground that the latter is "professional." "I think nothing human foreign to me," said the Roman of old, and our present-day culturists subscribe to the sentiment and urge the state to endow the study of language, of which but less than one per cent. of the population receive the benefit, while they are ready to oppose granting state aid to the study of pathology and sanitary science, by which every unit of the population would be benefited directly or indirectly.

A third cause of the failure of the public, through constituted authority, to support medical research is the prevalence of a spirit very much like that of fatalism. It is a harsh term to employ, and I use it apologetically, although I cannot find a milder one that befits the situation. In the east, where cholera and leprosy find a permanent home, there is an extraordinary apathy regarding them. No effort is made on the part of the natives to prevent the occurrence and spread of these diseases, or of any other, for that matter. Why should they, when they regard these as ordained by fate? What is the use of fighting against fate? We wonder and are perplexed at the phase of character presented, without thinking that we of the west, as a whole, exhibit the same.

We have had with us from time immemorial that disease, tuberculosis, of which annually more people die in America alone than of cholera in the whole world. It is indeed the scourge of the race. When cholera threatens to invade us we become vastly alarmed, and every agency employable by the state for that purpose is utilized to prevent its advent, while we regard with apathy the ravages of tuberculosis, on the plea that nothing can be done. Although it is a disease that is on the increase, and although its causation was definitely determined over eleven years ago, no civilized government has, so far as I am aware, directly encouraged any research with the object of finding a cure, preventing its spread, or stamping it out altogether. Had scientific facts indicated it to be incurable, we might have an excuse for our apathy; but facts point in the contrary direction, and show that a number recover on hygienic treatment alone. When I say that no government has favored research in tuberculosis, I omitted to mention that the national government of the United States has, through its Bureau of Animal Industry, taken up the question of tuberculosis in cattle. That does not need any comment.

Why should not tuberculosis, typhoid fever, diphtheria, scarlet fever, and other zymotic diseases be the subjects of research carried on under

state control and by state aid? When the state institutes investigations into hog cholera and cattle plagues, surely it ought to do no less for diseases of the human subject. It is true that the state has attempted to extend its functions in the direction of the prevention of disease through its sanitary officials; but so long as the number of deaths per annum preventable by ordinary means is more than two thousand for every million of people, it is evident that the state has not done its duty fully.

It is interesting to compare the aid extended by the public to theological and technical education with that granted, for the same purpose, to medicine. According to Dr. Gould, the editor of the *Philadelphia Medical News*, there is, in the United States, a sum of between seventeen and eighteen millions of dollars invested in theological education, while there is less than half a million invested in medical education. In Ontario, according to the estimates I have in hand, the figures are, respectively, \$2,100,000 and \$85,000. The amount invested in technical education in the United States it is difficult to estimate, but is undoubtedly a vast sum. In this province the amount given to aid agricultural and mechanical instruction and civil engineering reaches the neighborhood of \$300,000, and this from the state. It may be urged that whatever is given to hospitals should be considered under the head of medical education; but if it could be shown that they always serve that purpose, the contention would be, in some respects, a valid one. But who will contend that this very indirect aid, if it is that, is the equivalent of that granted to instruction in mining, mechanical and civil engineering, and to agricultural education? When millions are given voluntarily by the people to the support of instruction in the various denominational theologies, the state ought surely to presume to give a fraction of such a sum to aid that which is, in the language of the Marquis of Salisbury, "the most sober, the most absolute, the most positive of all the sciences."

Now, let us turn from the dark to the bright side of this picture. What of the future? I have already pointed out how all the sciences which lie at the foundation of medicine have progressed during the last thirty years, and I have stated that the present abundance of publications containing original observations on subjects within the provinces of these sciences indicates that a host of enthusiastic workers are directing their energies to problems, the solution of some of which would be of inestimable importance to the welfare of mankind. Just as it has been in the past thirty years, so in the coming generation will there be a steady increase in all our knowledge along this line. Indeed, within the next ten years some subjects, as, e.g., bacteriology, as it is now understood, will be worked out—that is, we will know the substantially important facts connected with it—and there will remain questions of minor importance only to

be solved. But bacteriology in a sense other than that commonly received is destined to be a subject of vast importance in the prevention of disease. I mean the biology of bacteria in its widest sense, embracing not only, as it does now, the determination of species, their external forms, their conditions of occurrence, and the effect of their presence in organisms, but also, and this more especially, their physiological chemistry. It is in physiological chemistry, in all its extent, that we are to find the study of the future. In this subject physiology, pathology, and bacteriology, as it will be, will be one. Physiology, in its departments of digestion, absorption, secretion, and nutrition, is now simply physiological chemistry; and when we analyze the functions of the specialized organs of the body, and find how these depend on nutrition as well as on specialization of structure, we can determine how great a part in physiology the chemistry of the cell and tissue plays. Pathology, in the sense in which we now use it, is quite as much interested, if not more so, in the advances made in physiological chemistry, for not only are a large number of diseases merely derangements of nutrition, but the phenomena of zymotic diseases are referable to the products of decomposition caused by bacteria in the organism. This study of physiological chemistry in its broader aspect has already begun. Bacteriologists are now engaged in the investigation, on the one hand, of the chemical products of the growth of bacteria, and, on the other, of the proteid compounds in the animal body which annihilate micro-organisms or prevent their growth. Pathologists have commenced the study of the chemistry of the tissues in disease. But most busy of all has been the physiological chemist himself. The researches on the proteids alone during the past three years might be considered as epoch-making, showing, as they do, how crude was our knowledge on many points connected with these. There is, indeed, a life's work in these for many an investigator in the future. That the phenomena of life occur in a complexity of proteids shows how far-reaching any important addition to our knowledge of them may be.

To physiological chemistry, then, belongs the future. Closely related as it is to physiology, pathology, bacteriology, and general biology, it will tend to overshadow these, and the number of its students will be greatly reinforced from the ranks of those endowed with scientific curiosity, for, in one of its branches, that of the physiology and chemistry of the cell, a subject now developing into prominence, the investigator stands face to face with the mother of mysteries, and there is no student who would not give a lifetime of work to be able to lift a corner of the veil to behold her features.

In therapeutics, physiological chemistry will be a modifying factor. At present we search the whole earth through for drugs to add to our list, and

we discover new ones in our laboratory. Those that we take ready-made from nature, as, for example, quinin, digitalin, etc., are, for the most part, excreted products of vegetable metabolism, whose presence and retention in the vegetable cell, like that of the nitrogenous products in the animal body, are injurious to life. In other words, we use the excreta or by-products of one kingdom to irritate or stimulate the organism in the other. Unless we believe that Providence ordained that vegetable organisms should produce such compounds to touch with exactness the springs of life within us, we may be excused from considering many of them as permanently placed in our pharmacopeia. Were all the therapeutists of the present day to search for a drug which would benefit cases of pancreatic diabetes, would they ever find one which would replace exactly that physiological compound whose absence in disease of the pancreas is the cause of the appearance of sugar in the blood? Is it possible to find a by-product of vegetable metabolism which will replace, when the thyroid gland is diseased or atrophied, that physiological compound whose formation and presence in the normal thyroid gland prevents that deposition of mucin in the body which characterizes the disease myxedema? These facts and the possible advances in our knowledge of physiological chemistry suggest how transient is the present character of our pharmacopeia. At the present day we indulgently smile when an old wife gives a child a dose of castor oil or calomel for toothache, knowing how very indirectly the toothache is alleviated, if at all; but what a large number of drugs must we employ whose action, contrary to what we suppose, may be as indirect as that of calomel in toothache!

Apart from this, and from the crudities at present exhibited in the administration of the so-called animal extracts, physiological chemistry is destined to be a very important factor in the treatment of bacterial diseases. It is now known that some animals do not take certain diseases because of the presence in their blood of proteids which destroy or prevent the growth of the bacteria causing those diseases. Hankin has investigated some of these proteids, and found that they belong to the class called nucleo-albumins. Vaughan and McClintock have determined that they are nucleins. The nucleins and nucleo-albumins have been but little studied, but that they are a very important class of compounds is rendered apparent also by the extreme probability that the digestive and other ferments belong to that class. Kossel advances the view that the animal organization defends itself against the poisonous proteids formed or secreted by bacteria through the nucleinic acid of the organism uniting with the toxic compound and thereby rendering it insoluble. If, as some physiological chemists maintain, the nucleins can be formed out of simpler elements in the laboratory, and if, further, a very large number of them

exist, their employment in the future as therapeutical reagents may serve to prevent or alleviate many diseases due to micro-organisms.

One may not hope for the extinction of disease. It will be present as long as life exists on this earth. Medicine has prolonged the average length of life by over three years, but it has also succeeded in bringing to maturity very many of the less robust, who, under the severer conditions which once obtained, would have succumbed. These are an easy prey, not only to bacterial, but also to functional diseases. The latter will always be with us, whether we have the other or not. The more medicine is perfected, the more of the less robust are saved to swell more and more the list of those who constantly require medical aid. The physically strong will not require it less than they do now, for, so long as human nature is what it is, it will sin as readily against physiological as against moral law. It is in the prevention of disease that progress ought to be made. I have already stated that there are over two thousand preventable deaths per annum in every million of inhabitants. To stop this waste of life—and stopped it ought to be—entails the prevention of a much greater amount of disease, because for every preventable death there are several cases of preventable disease. If the public could be convinced that tuberculosis could be made less prevalent, it would so act that probably another two thousand deaths would be prevented. To accomplish this, the state must teach sanitary science, not only to medical students, but to the whole people.

In the next thirty-five years, then, we will have a thorough knowledge of bacteria, of the compounds which they secrete or form during their growth, of the substances formed by them which are injurious to animal life, and of the compounds formed by the animal organism for self-defence. We will probably be able to assist nature, in some instances, at least, by adding to the supply of defensive material. We will have solved many of the problems of nutrition, while knowing more about others than we do now, and, as a consequence, our knowledge and treatment of disease will be far in advance of what it is at present. Of all this progress we can be certain, as it depends on forces now operating and increasing in strength as the years go by. It may be precipitated in the scientific world by any important increase in number of scientific investigators in medical science, in which case the rate of progress will be greater than I have attempted to outline.

What is the bearing of all this on the student's career? It is quite evident that if he rests content with the minimum of attainments demanded by a curriculum he will fail to achieve solid success in the future, when the physician must be more scientific than he is now; and, if he is intelligently ambitious, he will exercise his foresight by giving to

the sciences of his course that full attention which they require of him in order to prepare him for all the possibilities of a medical career. He must lay the foundations well and surely in his work in the laboratories, and he must be constantly, year by year, building on the foundation with such material as the times give. It is true that to know all the sciences thoroughly is impossible to any one, however brilliant he may be, and that, with the time at the disposal of the student, a complete familiarity with the sciences may not be expected of him.

He may, however, by concentrated industry, acquire a knowledge of general biology, physiology, chemistry, pathology, and bacteriology, which will be of immense service to him. It is often stated that the student cannot gain a competent knowledge of these subjects in the four or five years of the course. Does he get a competent knowledge of medicine and surgery before he graduates, and is his development in these subjects arrested when he receives his license to practise? If not, why should it be different in the case of the sciences? Should he not carry on the study of these sciences in post-graduate years? When the scientific specialist or the medical man urges that there is no opportunity for getting more than a smattering of the sciences, he forgets that the student of the present day travels a much less rugged road than *he* did. If you ask any old practitioner about the facilities for anatomy in his student days, he will describe a condition of affairs that will, perhaps, be unintelligible to you who are aware of our splendid anatomical equipment and methods for teaching anatomy. In my time, as a student, and that was not long ago the arrangements for learning anatomy, good as they were then, were far behind what they are now. In instruction in physiology ten years ago, no experiments were performed, and there were no demonstrations for the student. In pathology and bacteriology, in former years, it was seldom that a student had an opportunity for practical work. All that is changed. We have less of the fearful grinding out of lectures, and we make the student control all he reads by work in the laboratory. It appears to me that he is in a much better position to acquire the knowledge demanded by the curriculum than he was ten years ago. He does, indeed, what he did not do to any great extent in his undergraduate course then. The laboratory work compels him to observe and note, a feature of his training that was formerly developed at the bedside—a good place, indeed, for observation, but a bad one for commencing the training of it. Dr. Billings says that of the vast literature on medicine much of it is worthless, much of it is suggestive, and only one per cent., perhaps, of it is valuable. That, if correct, can be explained in only one way—and that is, that the contributors to this literature, who are amongst the best and most progressive

of the profession, are fearfully deficient in capacity for observation. What is responsible for this but the old-time methods under which the student was trained? The student of the present day has, indeed, everything in his favor, and he ought to cultivate to the full every opportunity which our modern methods of teaching offer him. He ought to study the sciences not simply for the purpose of passing examinations in them, but to avoid being an empiric in after years. The latter is one who relies on his own experience, or on that of others, without having therefor a scientific explanation. Empirics are not at all rare at the present day, and they usually style themselves "practical" men. As such, they are related, perhaps distantly, to the old "yarb" * woman who relies on her limited experience, and on nothing else. It is the fashion of this class to exalt the professional and deride the scientific subjects as if they were distinct and opposed. A physician whose training in the sciences may be very limited may, indeed, avoid empiricism by constantly examining and proving the phenomena of disease which present themselves; but how laborious such a process must be to him, and how much more practical is he who recognizes that the scientific and professional subjects of medicine are inseparable.

It is maintained that the medical profession is overcrowded. It is claimed by some that twenty thousand practitioners in the United States could be very well replaced by a thousand well-educated and well-trained ones. It is certainly not wanting in numbers in Great Britain, France, and Germany, and we are familiar with the statement that there are quite enough in Canada. Those who are already in it must have a greater professional experience than the student can get by close attention to professional requirements alone, valuable as these are; and if he neglects the sciences on which they are based when he gets a license to practise medicine, he is one more in the struggling mass, with no more moral right to succeed than the average man. The profession is not overcrowded to those who patiently and steadily train themselves in all the parts that distinguish a scientific practitioner of medicine. There cannot readily be too many of such, and if the student determines to be one of these, and carries out his determination, his future is assured.

A few years ago, a physician considered himself equipped for clinical work if he had a stethoscope, a few test tubes, with a spirit lamp, and perhaps an ophthalmoscope. At the present day, to be prepared for all cases, he must have a variety of instruments, the proper use of which requires a careful training in the laboratory, and also a very fair knowledge

* * For in all times, in the opinion of the multitude, witches, and old women, and impostors have had a competition with physicians. And what followeth? Even this: that physicians say to themselves, as Solomon expresseth it upon an higher occasion: 'If it befalleth to me as befalleth to the fools, why should I labor to be more wise?' — Bacon, "Advancement of Learning."

of physiology, physiological chemistry, and bacteriology. Some diseases may be and are diagnosed by the use of these instruments alone, or by methods taught in the laboratory, while in the diagnosis of other diseases these instruments and these methods furnish a very great assistance. Those who have examined the history of the past in medicine will agree with me when I say that the methods of diagnosis in the future will require a greater scientific knowledge than is even now the case.

To the student himself I would say, Cultivate the sciences which lie at the foundation of medicine, for they are to be the key to you that will unlock the treasure-house of the future. They will give to you that sense of satisfaction that arises out of your knowing that you are in the van with progress. Not any the less thereby, but rather the more fitted will you be for professional work when you enter upon it. For this cultivation there is abundance of opportunities in your undergraduate course; and, indeed, the Medical Council has, with a wise foresight, provided that you may pass the fifth year of your course in laboratory work wholly. If, on the other hand, you neglect the sciences, you will be hampered in the appreciation of your work, and the exigencies of a practice will prevent you from overtaking the arrears of knowledge due to that neglect. You may then fully realize your mistake, when regret is of no avail to repair it.

No one, I believe, esteems more highly than I do professional attainments and skill. Nor do I deride experience, for it is not that which makes you satisfied with what has been done, but rather that which stimulates your desire to know more. Perhaps the best view of experience is that given by Tennyson in his poem, "Ulysses." The old hero, who had gone unwillingly with the Greek host, has, after ten long years before Troy and ten years of peril and adventure on the sea, returned to Ithaca, and he is represented as resolving to take up once more the life of change and discovery. I quote one familiar passage because it describes my ideal of the scientific spirit, whether it is to be found in the laboratory or at the bedside, and because it gives to the student of to-day a glimpse of the life that may be his in after years:

"I am a part of all that I have met;
Yet all experience is an arch where through
Gleams that untravelled world whose margin fades
Forever and forever when I move.
How dull it were to pause, to make an end,
To rust unburnished, not to shine in use!
As tho' to breathe were life! Life piled on life
Were all too little, and of one to me
Little remains; but every hour is saved
From that eternal silence, something more,
A bringer of new things; and vile it were
For some three suns to store and hoard myself,
And this gray spirit yearning in desire
To follow knowledge, like a sinking star,
Beyond the utmost bound of human thought."

